ERIC NELSON

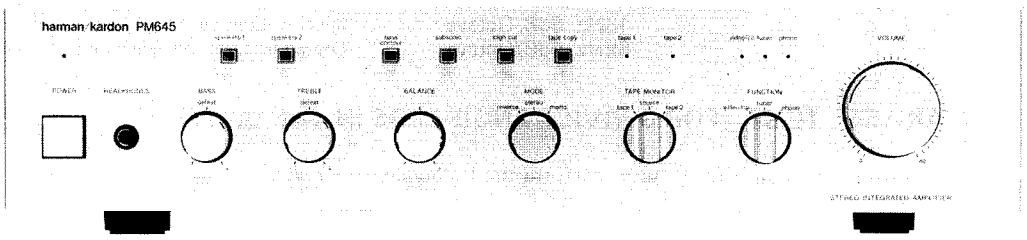
The Harman Kardon Model PM645

Manual No.79A

STEREO INTEGRATED AMPLIFIER

PM645

Technical Manual



harman/kardon
240 CROSSWAYS PARK WEST, WOODBURY, N. Y. 11797
1112-H15279A3 P-088410 1850 PRINTED IN JAPAN

SPECIFICATIONS

	Nominal	Limit
RMS Output Power		
8Ω, 1kHz, THD 0.1%	45.1W	≧40W
4Ω, 1kHz, THD 1.0%	77.6W	≧70W
High Instantaneous Current Capability (HCC)	35A	
Half Power Bandwith	10Hz ~ 100kHz	
Frequency Response at −3dB	4Hz ~ 135kHz	
Input Sensitivity		
Video/CD, Tuner	130mV ± 25mV	
Phono	2.2mV ± 0.2mV*	
Signal to Noise Ratio		
Video/CD, Tuner	82.6dB	≧75dB
Phono	81.4dB	≧75dB
Channel Separation at 10kHz		
Video/CD, Tuner	57.3dB	≧45dB
Phono	61dB	≧45dB
IM Distortion Ratio	0.08%	≦0.25%
Damping Factor at 1kHz	85	≧65
Tone Control Characteristics		
Bass at 50Hz		
Boost	10dB ± 2dB	
Cut	−10dB ± 2dB	
Treble at 10kHz		
Boost	10dB ± 2dB	
Cut	−10dB ± 2dB	
Filters		
Subsonic	15Hz, 6dB/Octave	
High Cut	6kHz, 6dB/Octave	

	Nominal	Limit
Bass Contour		
Boost at 50Hz	+10dB	
DC Output Voltage		
L channel	0mV ± 60mV	
R channel	0mV ± 60mV	
RIAA Equalization at Tape Out (20Hz ~ 20kHz) (No load)	0.6dB	≦1.5dB
Phono Overload (No load)	140mV	≧120mV
Dimensions (W x H x D)	17-1/2"x4-1/16"x13-7/8" (443 x 103 x 351 mm)	
Weight	14 lbs. 5 oz. (6.5 kg)	
Power Supplies		
U.S.A. and Canada models	AC120V, 60Hz	
General and German models	AC220/240V, 50/60Hz	
Power Consumption		
U.S.A. and Canada models	220W (270VA)	
General and German models	160W	

* Input Sensitivity (Phono) for German model is 2.3mV ± 0.2mV.

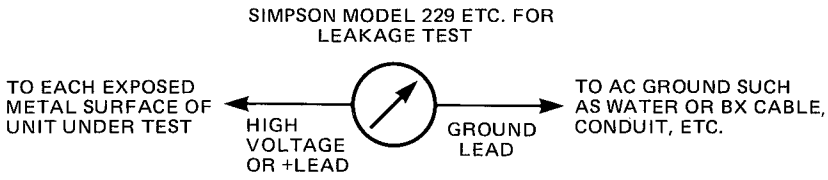
This specification is the target of servicing. But, there is a case that the specification is not applicable to the measurement condition and instrument.

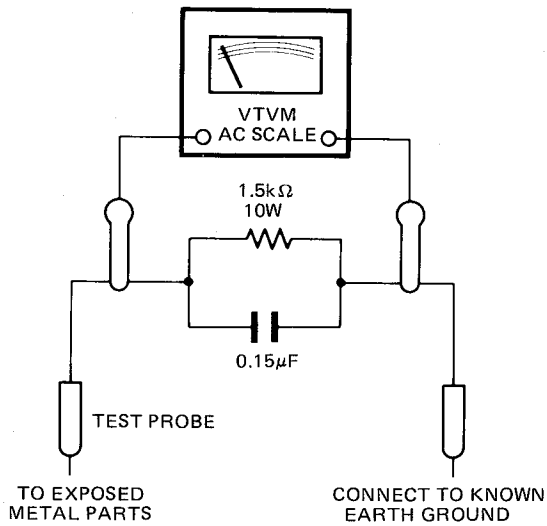
Specifications and components subject to change without notice. Overall performance will be maintained or improved.

LEAKAGE TEST (FOR SERVICE ENGINEERS IN THE U.S.A.)

Before returning the unit to the user, perform the following safety checks:

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the unit.
2. Be sure that any protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc. which were removed for servicing are properly reinstalled.
3. Be sure that no shock hazard exists; check for leakage current using Simpson Model 229 Leakage Tester, standard equipment item No. 21641, RCA Model WT540A or use alternate method as follows:
   Plug the power cord directly into a 120-volt AC receptacle (do not use an Isolation Transformer for this test). Using two clip leads, connect a 1500 Ohm, 10-watt resistor paralleled by a 0.15μF capacitor, in series with all exposed metal cabinet parts and a known earth ground, such as a water pipe or conduit. Use a VTVM or VOM with 1000 Ohms per volt, or higher, sensitivity to measure the AC voltage drop across the resistor. (See Diagram.) Move the resistor connection to each exposed metal part having a return path to the chassis (antenna, metal, cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor. (This test should be performed with the power switch in both the On and Off positions.)


SIMPSON MODEL 229 ETC. FOR LEAKAGE TEST
TO EACH EXPOSED METAL SURFACE OF UNIT UNDER TEST
HIGH VOLTAGE OR +LEAD
GROUND LEAD
TO AC GROUND SUCH AS WATER OR BX CABLE, CONDUIT, ETC.



A reading of 0.35 volt RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the unit to the owner.

ALIGNMENT PROCEDURES (REFER TO PAGES 10 AND 11)

Conditions:
- Set the Function selector to the "video/CD" position.
- Set the Volume control to minimum.
- Depress the Speaker 1 switch (button in).
- After the Power switch is pushed on, wait for 20 minutes before adjusting so that the most stable operation is obtained.

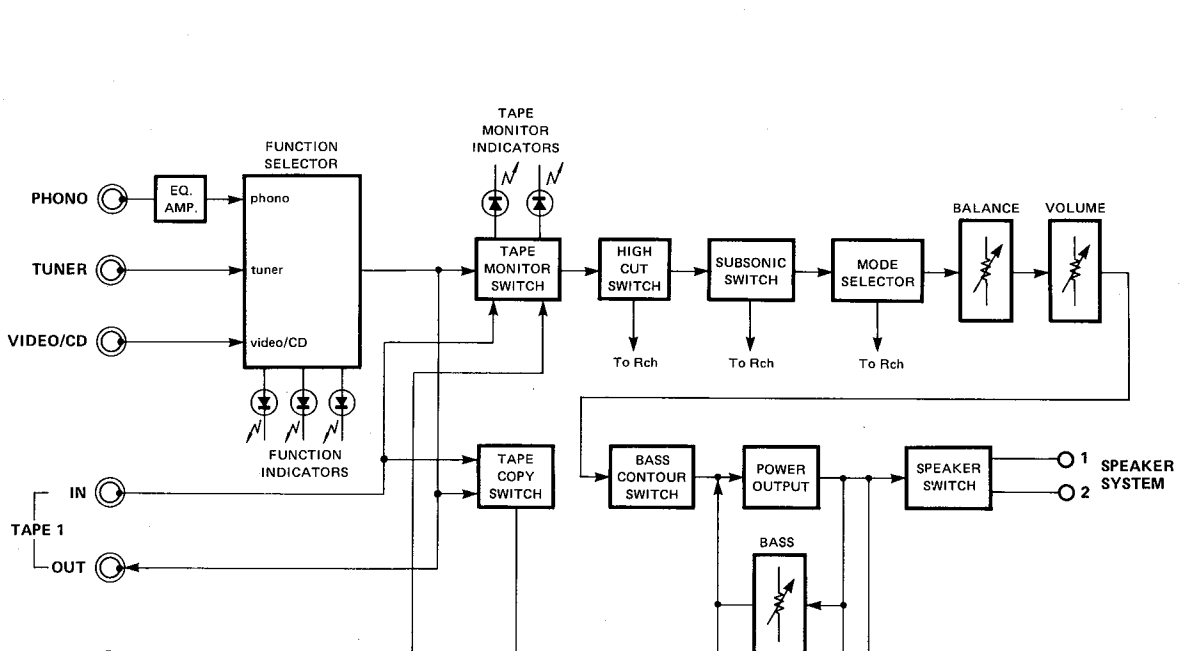
DC BALANCE CONFIRMATION

Step	Connection Equipments	For
1	• Connect the DC Volt Meter to Speaker System 1 terminal (Left and GND).	0 ± 50mV
2	• Connect the DC Volt Meter to Speaker System 1 terminal (Right and GND).	0 ± 50mV

IDLING CURRENT ADJUSTMENT

Step	Connection Equipments	Adjustment	For
1	• Connect the DC Volt Meter to TP1 (+) and TP2 (–).	VR401	33mV
2	• Connect the DC Volt Meter to TP3 (+) and TP4 (–).	VR402	33mV

BLOCK DIAGRAM



DISASSEMBLY PROCEDURES (REFER TO PAGES 5 AND 11)

1 CABINET TOP (122) REMOVAL
Remove 6 screws Ⓐ and remove the Cabinet Top (122).

2 FRONT PANEL ASSEMBLY (101) REMOVAL
1. Remove the Cabinet Top (122). (Refer to step 1 .)
2. Remove 6 screws Ⓑ and remove the Front Panel Assembly (101).

3 SPEAKER SWITCHES P.C. BOARD (PCB-10) REMOVAL
1. Remove the Front Panel Assembly (101). (Refer to step 2 .)
2. Remove 2 screws Ⓒ and remove the Speaker Switches P.C. Board (PCB-10).

4 BASS CONTOUR P.C. BOARD (PCB-2) REMOVAL
1. Remove the Front Panel Assembly (101). (Refer to step 2 .)
2. Remove 2 screws Ⓓ and remove the Bass Contour P.C. Board (PCB-2).

5 FUNCTION AND TAPE MONITOR SWITCHES P.C. BOARD (PCB-6) REMOVAL
1. Remove the Front Panel Assembly (101). (Refer to step 2 .)
2. Pull out the Function and Tape Monitor Knob Assemblies (103).
3. Remove 2 hexagon nuts Ⓔ and remove the Function And Tape Monitor Switches P.C. Board (PCB-6).

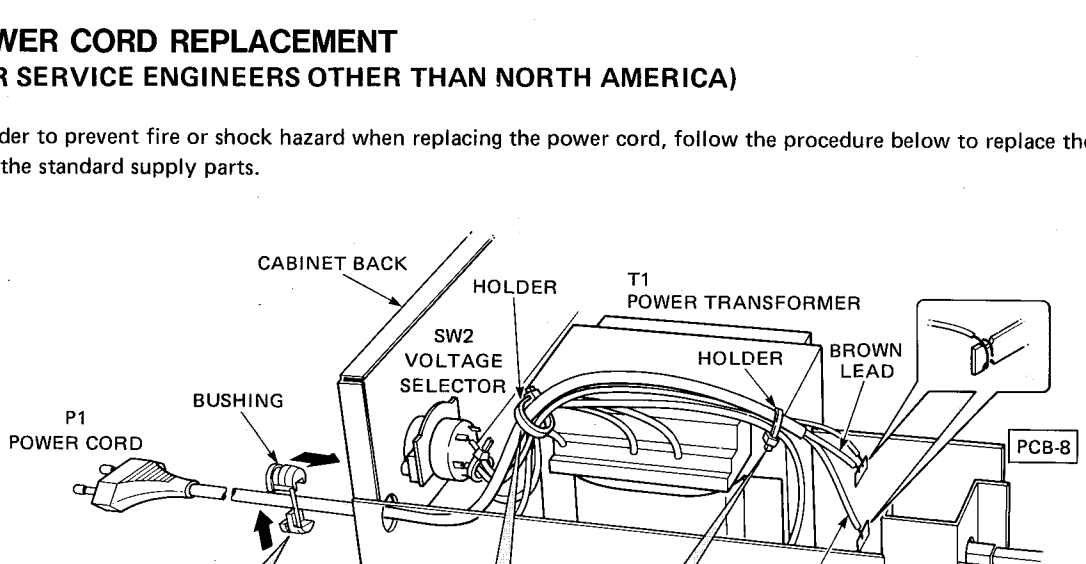
6 VOLUME CONTROL P.C. BOARD (PCB-9) REMOVAL
1. Remove the Front Panel Assembly (101). (Refer to step 2 .)
2. Pull out the Volume Knob Assembly (104).
3. Remove hexagon nut Ⓕ and remove the Volume Control P.C. Board (PCB-9).

7 HEADPHONE JACK P.C. BOARD (PCB-11) REMOVAL
1. Remove the Front Panel Assembly (101). (Refer to step 2 .)
2. Remove the fixture Ⓖ fixing the Headphone Jack P.C. Board (PCB-11) and remove the Headphone Jack P.C. Board (PCB-11).

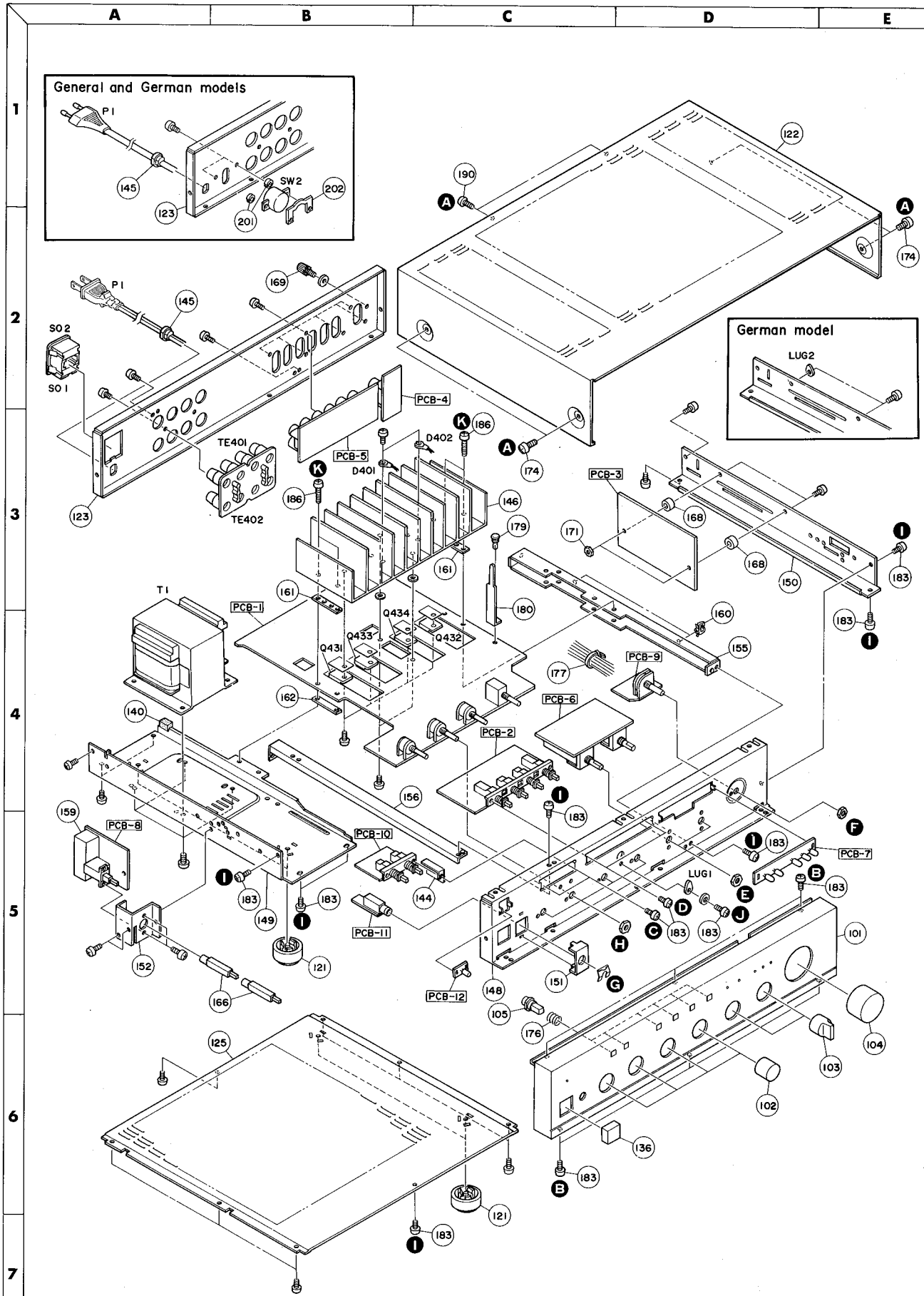
8 MAIN P.C. BOARD (PCB-1) REMOVAL
1. Remove the Speaker Switches (PCB-10), Bass Contour (PCB-2), Function and Tape Monitor Switches (PCB-6), Volume Control (PCB-9) and Headphone Jack (PCB-11) P.C. Boards. (Refer to Steps 1 through 7 .)
2. Straighten the catches fixing the Power Indicator P.C. Board (PCB-12) and Function Indicator P.C. Board (PCB-7) respectively and remove each P.C. Board.
3. Pull out the 4 Knob Assemblies (102), Power Push Button (136) and Levers (166).
4. Remove 4 hexagon nuts Ⓗ .
5. Remove screw Ⓙ and remove the LUG1 with lead wire from the Chassis (148).
6. Remove 8 screws Ⓘ and remove the Chassis (148).
7. Remove 4 screws Ⓚ and remove the Main P.C. Board (PCB-1) with the Heat Sink (146). If necessary, unsolder the lead wires.

POWER CORD REPLACEMENT
(FOR SERVICE ENGINEERS OTHER THAN NORTH AMERICA)

In order to prevent fire or shock hazard when replacing the power cord, follow the procedure below to replace the parts with the standard supply parts.



GENERAL UNIT EXPLODED VIEW



GENERAL UNIT PARTS LIST

Ref. No.	Part No.	Description
101	A443-PM645A	Front Panel Assembly A443-PM645C (BLACK)
102	A630-PM645A (G BLACK)	Knob Assembly, Bass, Treble, Balance, Mode
103	A630-PM645B (H BLK)	Knob Assembly, Tape Monitor, Function
104	A630-PM645C (J BLK)	Knob Assembly, Volume
105	A662-PM645A (B BLK)	Push Button Assembly, Speakers 1/2, Bass Contour, Subsonic, High Cut, Tape Copy
121	1319-0139	Foot
122	1414-04901	Cabinet Top
123	1424-12301	Cabinet Back (for U.S.A. and Canada models)
"	1424-12401	Cabinet Back (for General and German models)
125	1424-13101	Cabinet Bottom
136	1660-00401 (100403 BLK)	Push Button, Power
140	2112-11236	Sponge
144	2216-7152	Shield Plate
145	2214-415027	Bushing
146	2222-7167	Heat Sink
148	2211-7257	Chassis
149	2211-7261	Chassis
150	2211-7262	Chassis
151	2219-7879	Bracket
152	2219-7987	Bracket
155	2219-7990	Bracket
156	2219-7991	Bracket
159	2240-7176	Protector
160	2240-7061	Holder
161	2224-7069	Insulator
162	2224-7090	Insulator
166	2672-7018	Lever
168	2132-01405	Spacer
169	2310-7017	Special Screw
171	2446-301Z9	Hexagon Nut
174	2347-400647	Self-tapping Screw (+) (4 x 6 mm)
176	2651-210189	Spring
177	2240-7120	Holder
179	2459-3003511	Fastener
180	2218-7011	Holding Bracket
183	2347-300627	Self-tapping Screw (+) (3 x 6 mm)
186	2347-301227	Self-tapping Screw (+) (3 x 12 mm)
190	2347-300647	Self-tapping Screw (+) (3 x 6 mm)
201	2132-7116	Spacer (only General and German models)
202	2440-7017	Special Nut (only General and German models)
	1111-J30171	Owner Guide (for U.S.A. model)
	1111-J30172	Owner Guide (for Canada, General and German models)
	1221-797144	Packing Box
	1222-7216	Packing Cushion (2 Used)

ELECTRICAL PARTS LIST

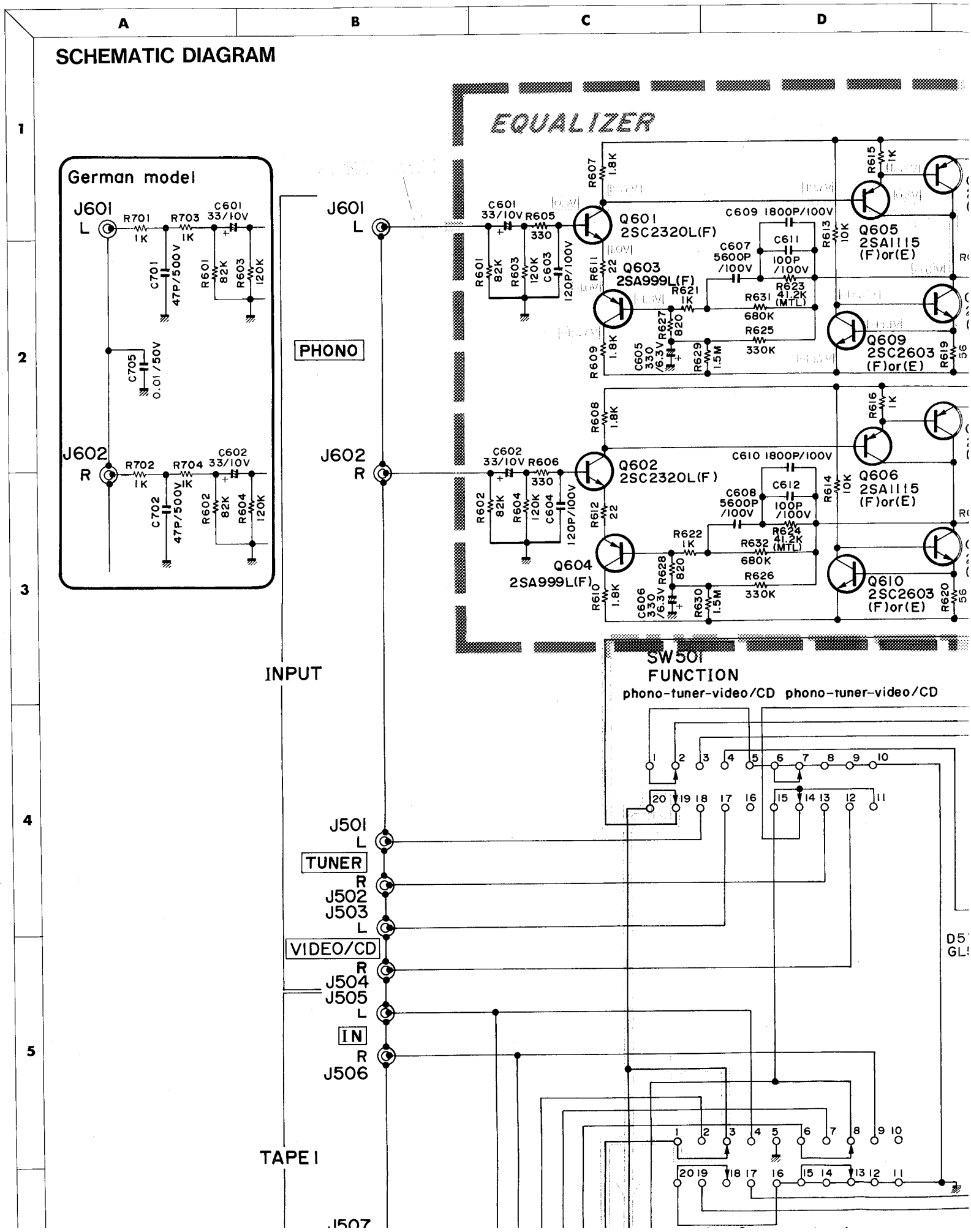
Ref. No.	Part No.	Description
	CHASSIS MISCELLANEOUS	
⚠ P1	4161-71151	Power Cord (for U.S.A. and Canada models)
⚠ "	4161-7256	Power Cord (for General and German models)
⚠ T1	5584-701462	Power Transformer (for U.S.A. and Canada models)
⚠ "	5584-701463	Power Transformer (for General and German models)
⚠ SW2	4411-102729	Rotary Switch, Voltage Selector (General and German models only)
⚠ SO1/2	4474-157	AC Outlet, Unswitched, Switched (only U.S.A. and Canada models)
TE401/402	4214-121	Speaker Terminal, Speaker System 1, Speaker System 2
⚠ F1	5732-402031	Fuse, 4A, 125V (for U.S.A. and Canada models)
⚠ "	5732-202030	Fuse, T2A, 250V (for General and German models)
LUG1	4211-4	Lug Terminal
LUG2	4211-4	Lug Terminal (only German model)
	PCB-1 MAIN P.C. BOARD	
	RESISTORS	
⚠ R15	5102-8204715	82Ω, ±2%, 1/4W, Fuse
⚠ R47, 48	5102-8204713	82Ω, ±2%, 1/4W, Fuse
R431, 432	5174-910381	91Ω, ±1%, 1/4W, Metal
⚠ R449, 450, 451, 452	5102-4704713	47Ω, ±2%, 1/4W, Fuse
⚠ R467, 468, 469, 470	5102-1004713	10Ω, ±2%, 1/4W, Fuse
R483, 484	5174-680381	68Ω, ±1%, 1/4W, Metal
R489/493, 490/494	5273-R22672	0.22Ω, ±10%, 3W x 2, Cement
R491, 492	5171-471572	470Ω, ±5%, 1W, Metal
R497, 498	5173-150571	15Ω, ±5%, 2W, Metal
	CONTROLS	
VR401, 402	5101-10271920	1kΩB
VR501/502	5113-50381122	50kΩMN, Balance (w/Hexagon Nut)
VR505/506	5113-10420122	100kΩ, Bass (w/Hexagon Nut)
VR507/508	5113-50321122	50kΩC, Treble (w/Hexagon Nut)
	CAPACITORS	
C5, 6	5341-808Y0959	8000μF, ±20%, 45V, Electrolytic
C9	5345-336B041	33μF, ±20%, 10V, Electrolytic
C10	5345-476F041	47μF, ±20%, 50V, Electrolytic
C21, 22, 23, 24	5345-227D041	220μF, ±20%, 25V, Electrolytic
C401, 402	5345-476B0951	47μF, ±20%, 10V, Electrolytic
C405, 406	5345-227A0951	220μF, ±20%, 6.3V, Electrolytic
C407, 408	5353-020934	2pF, ±0.5pF, 500V, Mica
C409, 410	5359-1015851	100pF, ±5%, 100V, Polypropylene
C411, 412	5345-106E041	10μF, ±20%, 35V, Electrolytic
C421, 422, 423, 424	5345-337F041	330μF, ±20%, 50V, Electrolytic
C505, 506	5345-225F0951	2.2μF, ±20%, 50V, Electrolytic
C511, 512	5345-106C0951	10μF, ±20%, 16V, Electrolytic
C517, 518	5359-2215851	220pF, ±5%, 100V, Polypropylene
C803	5352-4741957	0.47μF, ±10%, 250V, Metalized Polyester (only German model)
	TRANSISTORS	
Q3, 4, 11, 12, 409, 410, 415, 416	5611-970(BL)	2SA970(BL)
Q5, 401, 402, 403, 404, 411, 412, 413, 414	5613-2240(BL)	2SC2240(BL)
Q6, 9, 13, 405, 406, 407, 408	5613-2603(F)	2SC2603(F) or 2SC2603(E)
Q7, 8, 10, 14	5611-1115(F)	2SA1115(F) or 2SA1115(E)
Q15	5611-817(Y)	2SA817(Y) or 2SA817(O)
Q16	5613-1627(Y)	2SC1627(Y) or 2SC1627(O)
Q417, 418	5612-646A(C)	2SB646A(C)
Q419, 420	5614-666A(C)	2SD666A(C)
Q421, 422	5613-945(K)	2SC945(K) or 2SC945(P)

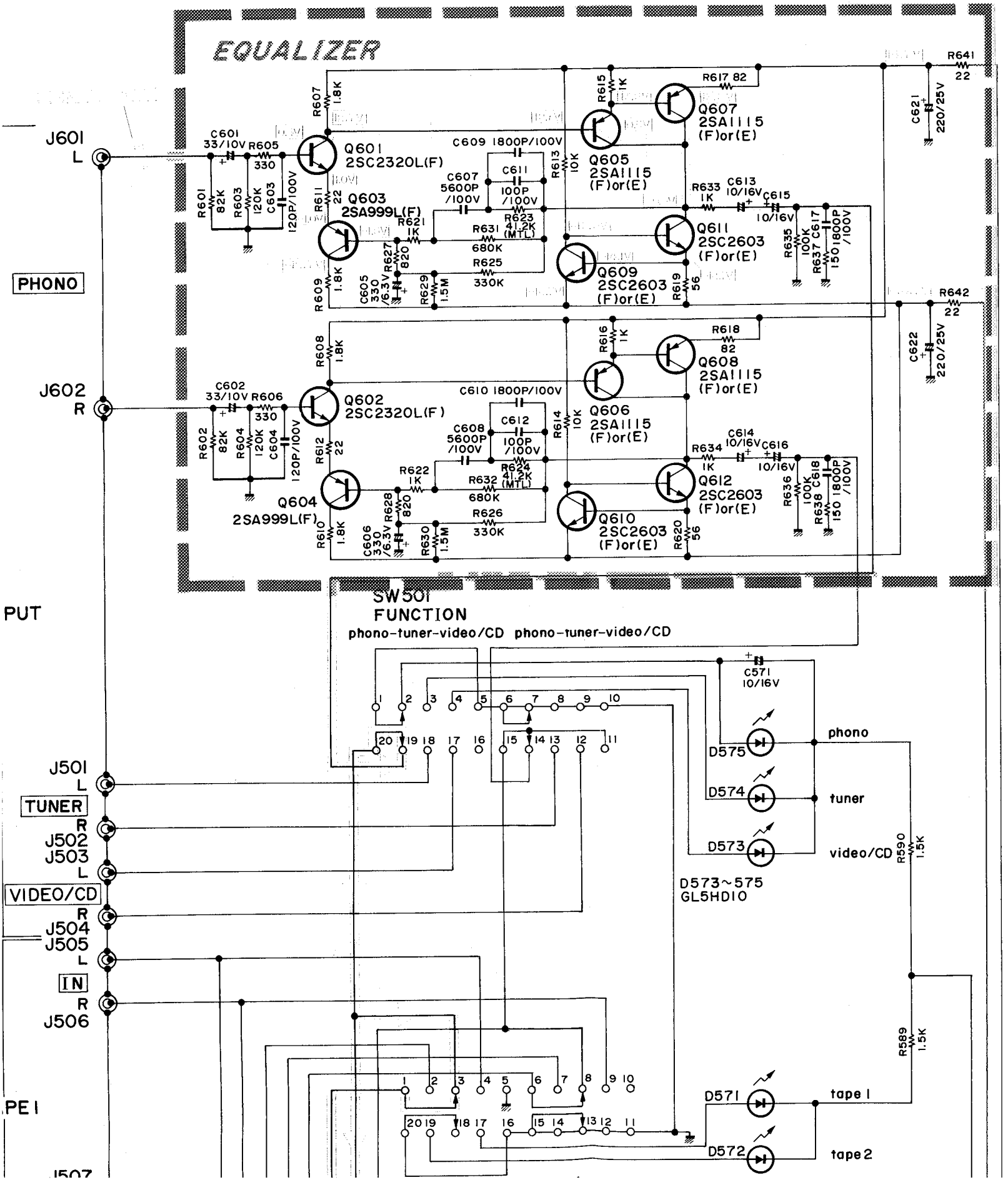
Ref. No.	Part No.	Description
Q423, 424, 425, 426	5614-667A(C)	2SD667A(C)
Q427, 428, 429, 430	5612-647A(C)	2SB647A(C)
Q431, 432	5613-3182(O)	2SC3182(O) } O.P.
Q433, 434	5611-1265(O)	2SA1265(O) }
	DIODES	
⚠ D1, 2, 3, 4	5632-ERC102FL	ERC102FL
⚠ D5, 6, 403, 404, 405, 406	5632-DS135E	DS135E
D8	5635-HZ11B2L	Zener, HZ11B-2L
D10	5635-HZ6A-2L	Zener, HZ6A-2L
D11, 407, 408	5631-1S2473	1S2473
D13, 14	5635-HZ15-2L	Zener, HZ15-2L
D401, 402	5641-MV12YM	Varistor, MV12YM
	COILS	
L401, 402, 403, 404	5597-45502	Ferrite Bead
L405, 406	5991-7165	
	MISCELLANEOUS	
SW503	4411-403711	Rotary Switch, Mode
CN1	4443-060185	Connector, 6 Pos.
CN2	4443-030185	Connector, 3 Pos.
	2132-5049	Spacer, R16, R17 (only General and German models)
	PCB-2 BASS CONTOUR P.C. BOARD	
	CAPACITORS	
C521, 522	5345-104F0951	0.1μF, ±20%, 50V, Electrolytic
C525, 526	5345-107D041	100μF, ±20%, 25V, Electrolytic
C529, 530	5345-224F0951	0.22μF, ±20%, 50V, Electrolytic
C581, 582	5345-227D041	220μF, ±20%, 25V, Electrolytic
	TRANSISTORS	
Q501, 502, 505, 506	5613-2603(F)	2SC2603(F) or 2SC2603(E)
Q503, 504	5611-1115(F)	2SA1115(F) or 2SA1115(E)
	DIODES	
D521, 522	5635-HZ12B2L	Zener, HZ12B-2L
	MISCELLANEOUS	
SW511/512/513/514	4431-04127170	Push Switch, Tape Copy, High Cut, Subsonic, Bass Contour
	PCB-3 PHONO EQUALIZER P.C. BOARD	
	RESISTORS	
R623, 624	5174-Z412228	41.2kΩ, ±0.5%, 1/4W, Metal
	CAPACITORS	
C601, 602	5345-336B0951	33μF, ±20%, 10V, Electrolytic
C603, 604	5359-1215851	120pF, ±5%, 100V, Polypropylene
C605, 606	5345-337A0952	330μF, ±20%, 6.3V, Electrolytic
C607, 608	5359-5625851	5600pF, ±5%, 100V, Polypropylene
C609, 610, 617, 618	5359-1825851	1800pF, ±5%, 100V, Polypropylene
C611, 612	5359-1015851	100pF, ±5%, 100V, Polypropylene
C613, 614, 615, 616	5345-106C0951	10μF, ±20%, 16V, Electrolytic
C621, 622	5345-227D041	220μF, ±20%, 25V, Electrolytic
	TRANSISTORS	
Q601, 602	5613-2320L(F)	2SC2320L(F)
Q603, 604	5611-999L(F)	2SA999L(F)
Q605, 606, 607, 608	5611-1115(F)	2SA1115(F) or 2SA1115(E)
Q609, 610, 611, 612	5613-2603(F)	2SC2603(F) or 2SC2603(E)
	PCB-4 PHONO INPUT JACKS P.C. BOARD	
J601/602	4482-7117	2-Pin Jack, Phono
C701, 702	5353-470534	Capacitor, 47pF, ±5%, 500V, Mica (only German model)

Ref. No.	Part No.	Description
	PCB-5 INPUT/OUTPUT JACKS P.C. BOARD	
J501/502/503/504/505/506, 507/508/509/510/511/512	4486-8	6-Pin Jack, Tuner, Video/CD, Tape 1 In/Out, Tape 2 In/Out
C707, 708	5353-470534	Capacitor, 47pF, ±5%, 500V, Mica (only German model)
	PCB-6 FUNCTION AND TAPE MONITOR SWITCHES P.C. BOARD	
SW501, 502	4412-043742	Rotary Slide Switch, Function, Tape monitor
	PCB-7 FUNCTION INDICATORS P.C. BOARD	
C571	5345-106C0951	Capacitor, 10μF, ±20%, 16V, Electrolytic
D571, 572, 573, 574, 575	5637-GL5HD10	L.E.D., GL5HD10, Red, Tape 1, Tape 2, Video/CD, Tuner, Phono Indicators
	PCB-8 POWER SWITCH P.C. BOARD	
⚠ C1	5352-1030959	Capacitor, 0.01μF, ±20%, AC125V, Metalized Polyester (for U.S.A. and Canada models)
⚠ C1	5352-1030958	Capacitor, 0.01μF, ±20%, AC250V, Metalized Polyester (for General and German models)
⚠ R70	5135-335J50P	Resistor, 3.3MΩ, ±5%, 1/2W, Carbon (only General and German models)
⚠ SW1	4431-A01716	Push Switch, Power
	4472-0131	Fuse Holder (X2)
	PCB-9 VOLUME CONTROL P.C. BOARD	
VR503/504	5113-10419122	Control, 100kΩB, Volume (w/Hexagon Nut)
	PCB-10 SPEAKER SWITCHES P.C. BOARD	
SW401/402	4431-02047464	Push Switch, Speakers 1, Speakers 2
	PCB-11 HEADPHONE JACK P.C. BOARD	
J401	4451-00159	Jack, Headphones
	PCB-12 POWER INDICATOR P.C. BOARD	
C2	5345-106C0951	Capacitor, 10μF, ±20%, 16V, Electrolytic
D7	5637-GL5HD10	L.E.D., GL5HD10, Red, Power Indicator

⚠ SAFETY RELATED COMPONENT. USE ONLY EXACT REPLACEMENT PART AS SPECIFIED.

SCHEMATIC DIAGRAM




EQUALIZER
J601
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J504
J505
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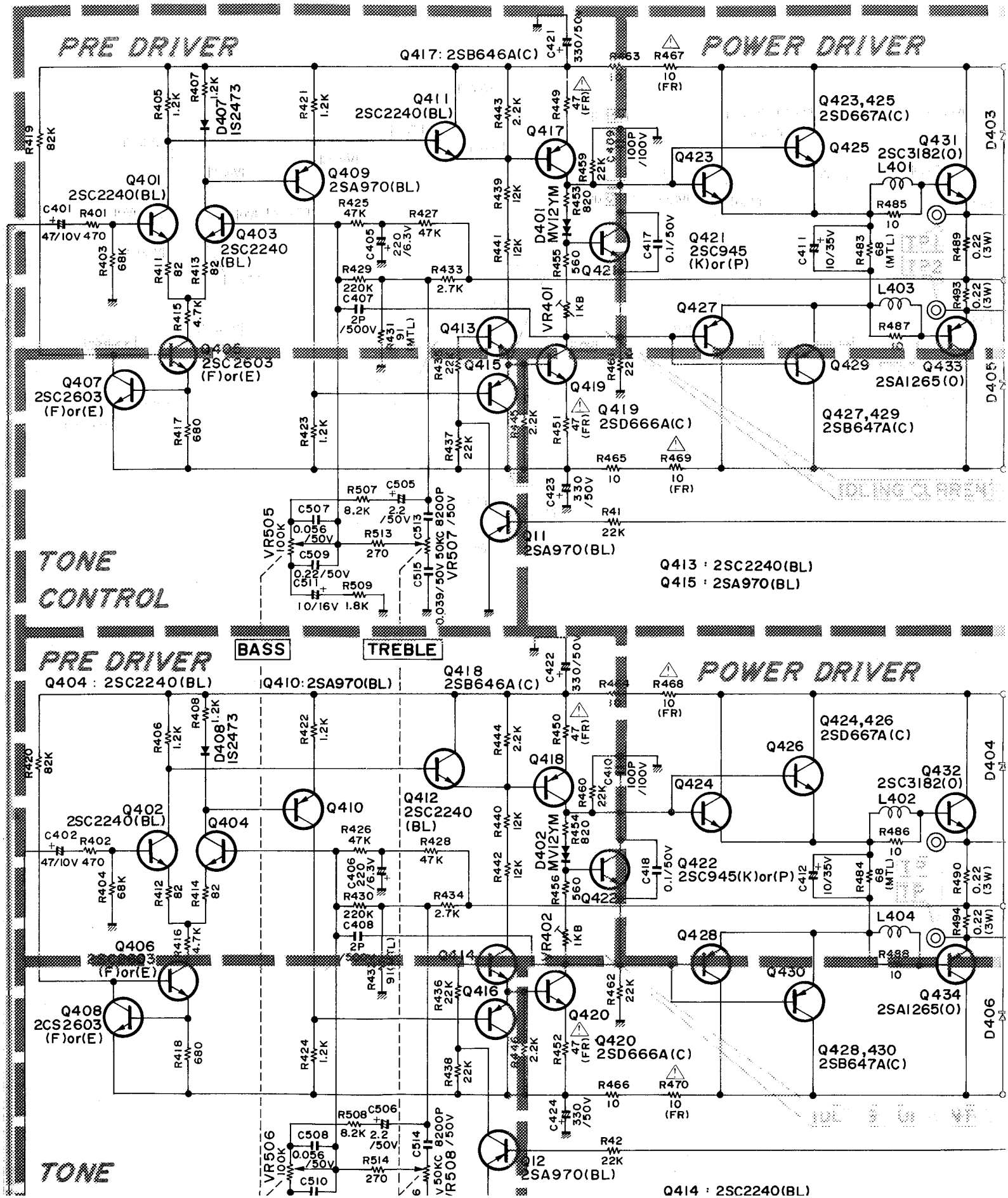
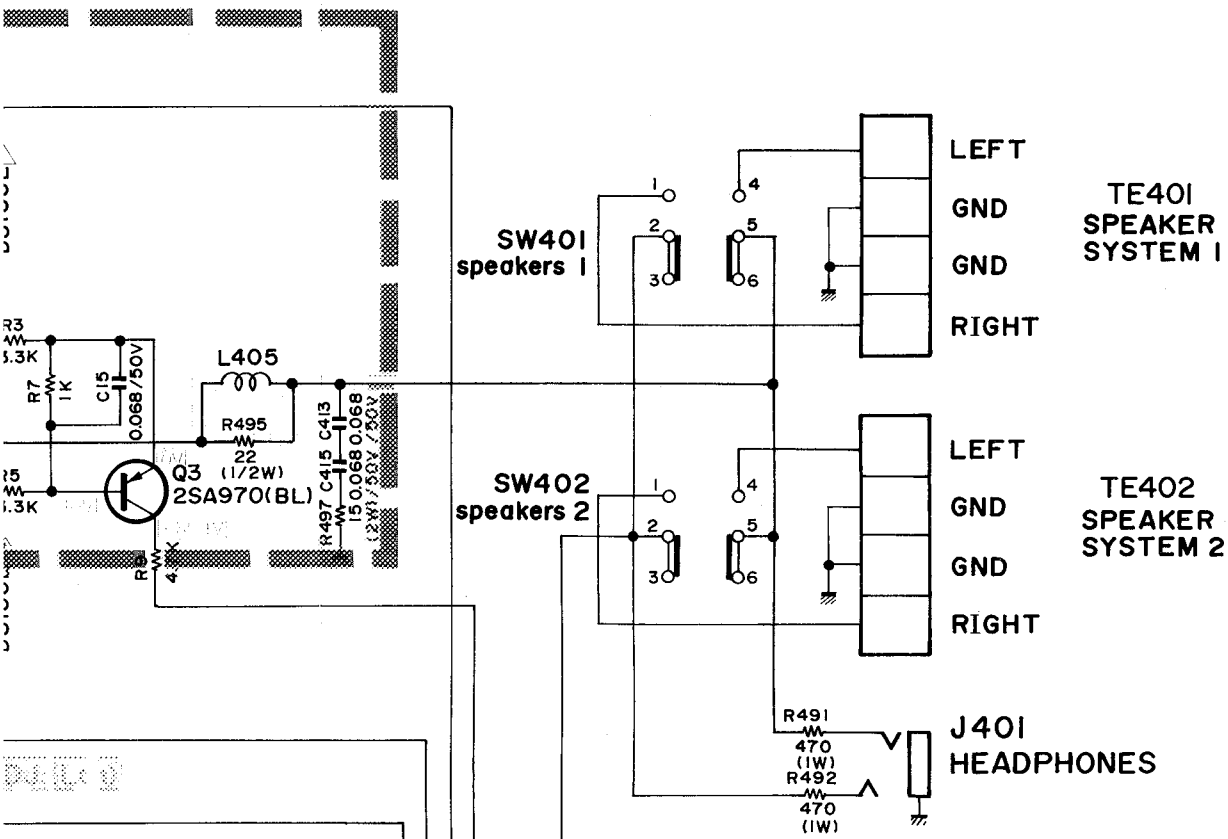
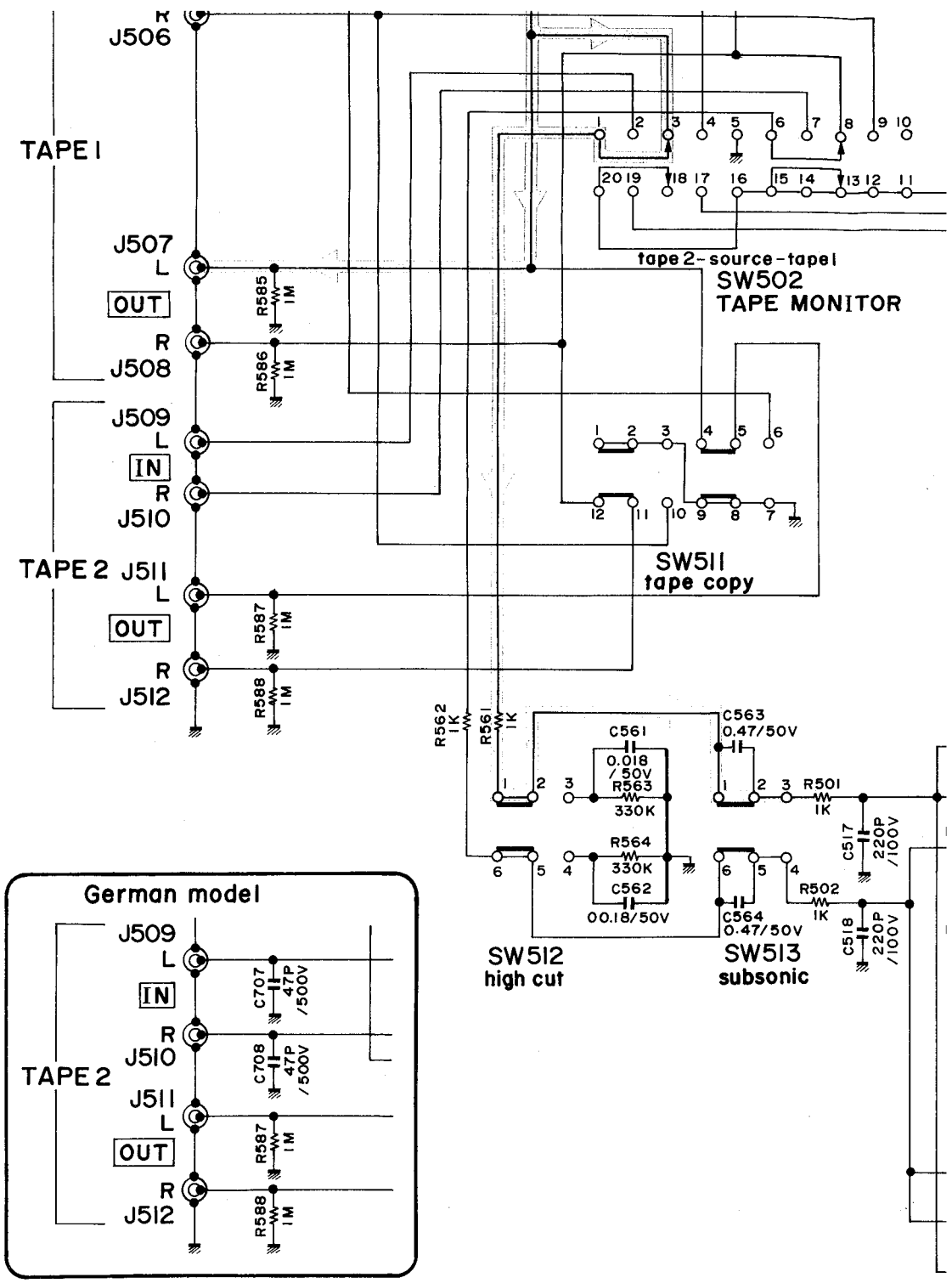
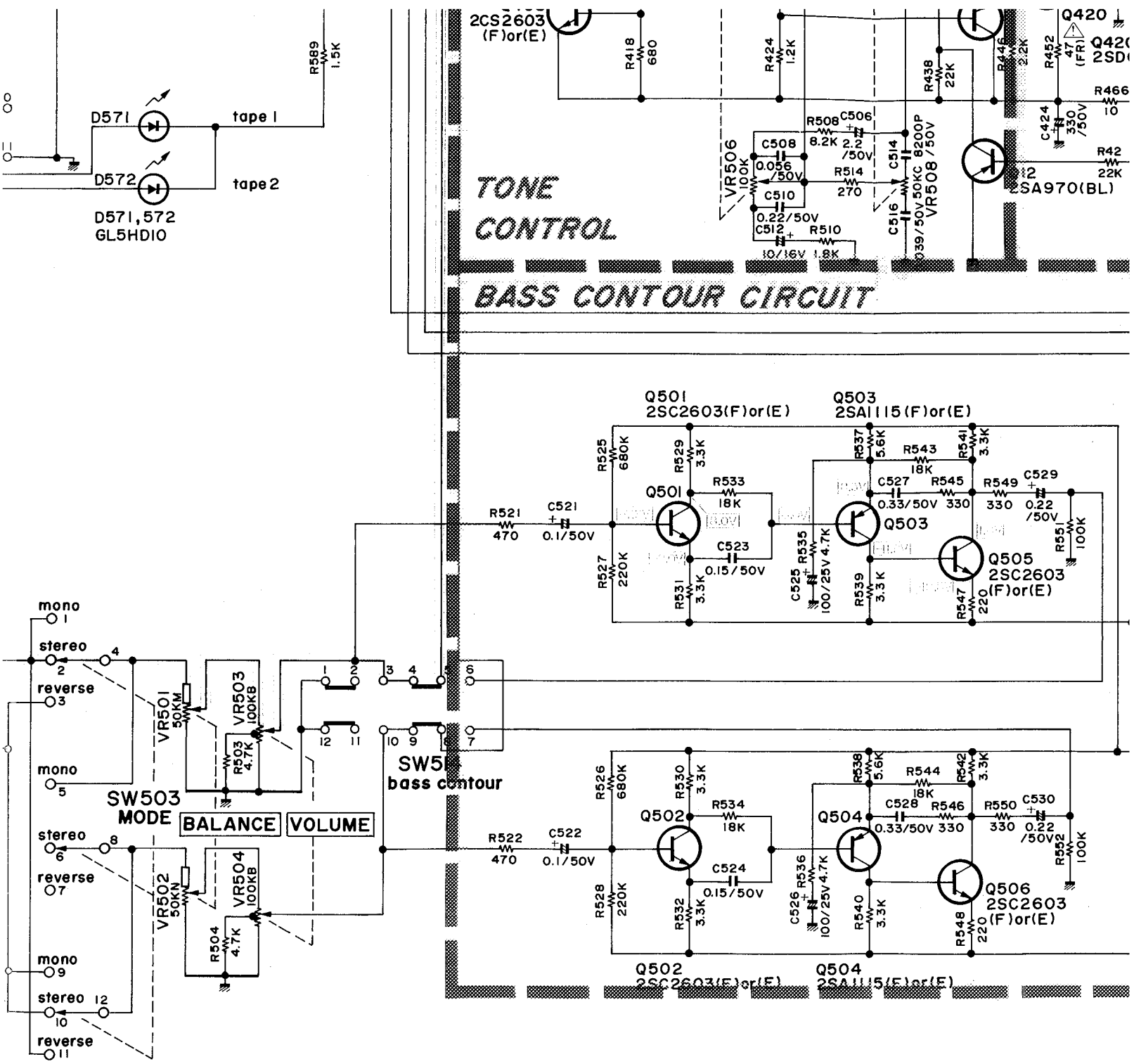
J506
PE I
J507
Q601 2SC2320L(F)
Q602 2SC2320L(F)
Q603 2SA999L(F)
Q604 2SA999L(F)
Q605 2SA1115 (F)or(E)
Q606 2SA1115 (F)or(E)
Q607 2SA1115 (F)or(E)
Q608 2SA1115 (F)or(E)
Q609 2SC2603 (F)or(E)
Q610 2SC2603 (F)or(E)
Q611 2SC2603 (F)or(E)
Q612 2SC2603 (F)or(E)
SW501
FUNCTION
phono-tuner-video/CD phono-tuner-video/CD
D575
D574
D573
D573~575
GL5HD10
D571
D572
phono
tuner
video/CD
tape 1
tape 2


PRE DRIVER
POWER DRIVER
Q417: 2SB646A(C)
Q411 2SC2240(BL)
Q409 2SA970(BL)
Q401 2SC2240(BL)
Q403 2SC2240 (BL)
Q405 2SC2603 (F)or(E)
Q407 2SC2603 (F)or(E)
D407 1S2473
D401 MV12YM
VR401 1KB
Q413
Q415
Q419
Q421 2SC945 (K)or(P)
Q423,425 2SD667A(C)
Q423
Q425
Q427
Q429
Q431 2SC3182(O)
Q433 2SA1265(O)
L401
L403
Q419 2SD666A(C)
Q427,429 2SB647A(C)
IDLING CURRENT
TONE CONTROL
VR505 100K
VR507 50KC 8200P /50V
Q411 2SA970(BL)
Q413 : 2SC2240(BL)
Q415 : 2SA970(BL)
BASS
TREBLE
PRE DRIVER
Q404 : 2SC2240(BL)
Q410:2SA970(BL)
Q418 2SB646A(C)
POWER DRIVER
Q412 2SC2240 (BL)
Q410
Q402 2SC2240(BL)
Q404
Q406 (F)or(E)
Q408 2CS2603 (F)or(E)
D408 1S2473
D402 MV12YM
VR402 1KB
Q416
Q420
Q422 2SC945(K)or(P)
Q424,426 2SD667A(C)
Q424
Q426
Q428
Q430
Q432 2SC3182(O)
Q434 2SA1265(O)
L402
L404
Q420 2SD666A(C)
Q428,430 2SB647A(C)
IDLING CURRENT
TONE
VR506 100K
VR508 50KC 8200P /50V
Q412 2SA970(BL)
Q414 : 2SC2240(BL)

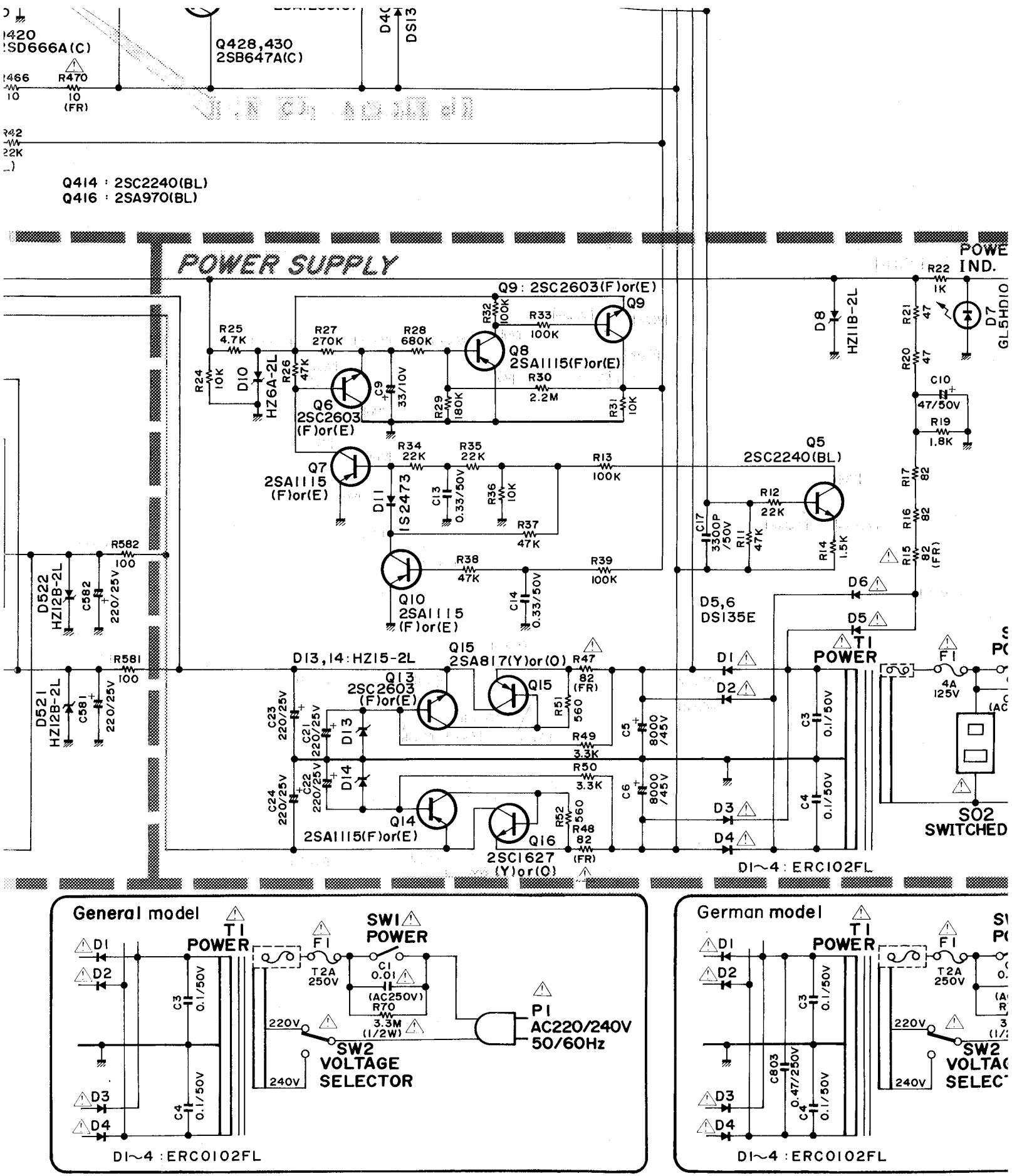
	K	L	M	N

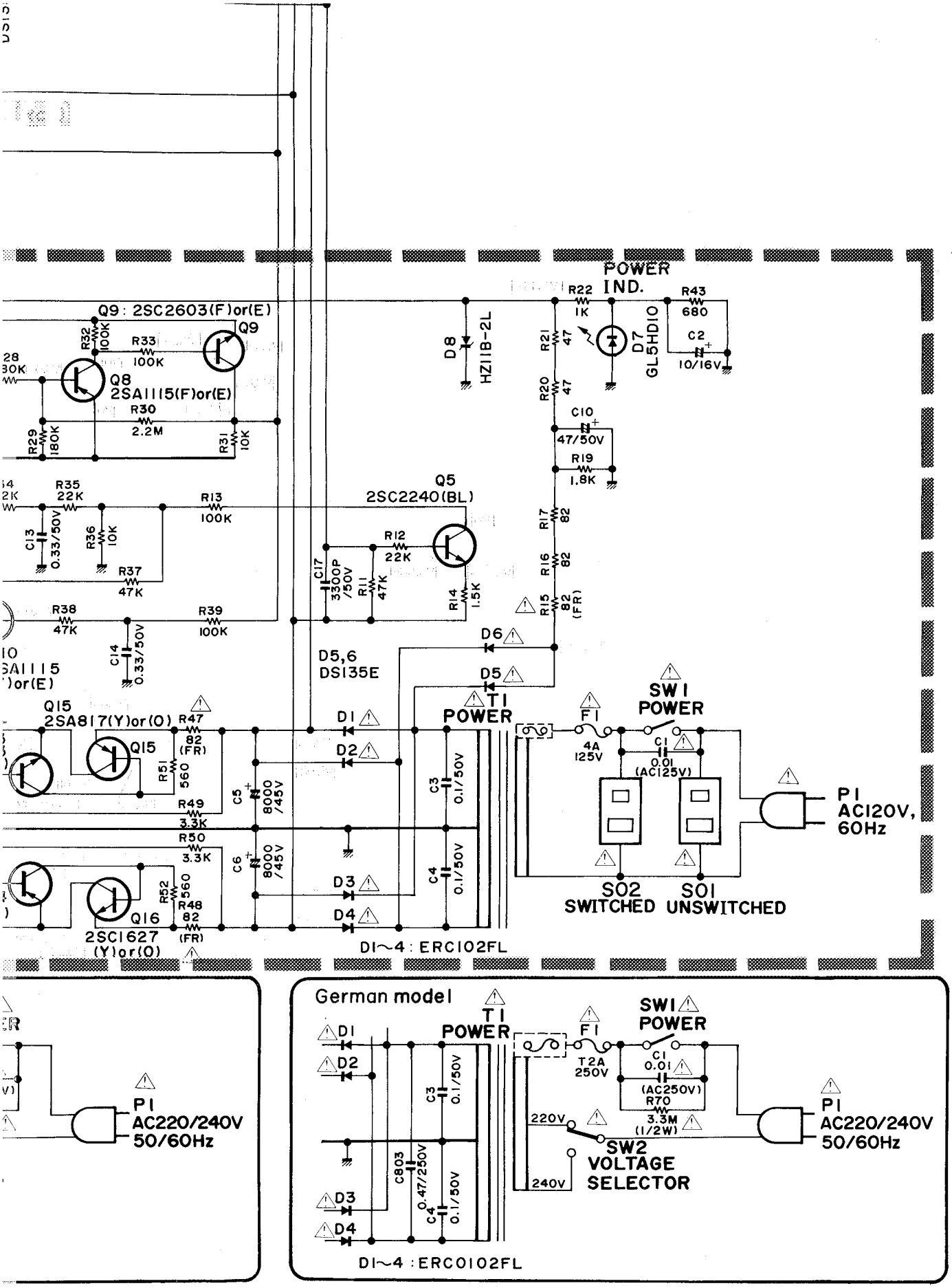

SW401
speakers 1
LEFT
GND
GND
RIGHT
TE401
SPEAKER
SYSTEM 1
SW402
speakers 2
LEFT
GND
GND
RIGHT
TE402
SPEAKER
SYSTEM 2
R491
470
(1W)
R492
470
(1W)
J401
HEADPHONES
L405
R495
22
(1/2W)
Q3
2SA970(BL)
C15
0.068/50V
R7
1K
R8
4.7K
L406
R496
22
(1/2W)
Q4
2SA970(BL)
C16
0.068/50V
R9
4.7K
R10
4.7K


R
J506
TAPE 1
J507
L
OUT
R
J508
J509
L
IN
R
J510
TAPE 2
J511
L
OUT
R
J512
R585 1M
R586 1M
R587 1M
R588 1M
tape 2-source-tape 1
SW502
TAPE MONITOR
SW511
tape copy
R562 1K
R561 1K
C561
0.018 /50V
R563
330K
R564
330K
C562
00.18/50V
C563
0.47/50V
C564
0.47/50V
R501
1K
R502
1K
C517
220P /100V
C518
220P /100V
SW512
high cut
SW513
subsonic
German model
C707 47P /500V
C708 47P /500V



1. ALL RESISTANCES VALUES ARE IN Ω.
   KΩ=1000Ω, MΩ=1000KΩ.
2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
3. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=μμF
4. [...V] : DC VOLTAGE AT NO SIGNAL
5. ⚠ SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

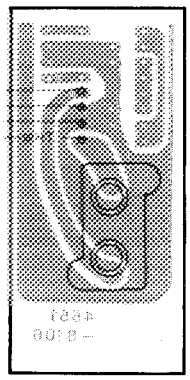

Q428,430
2SB647A(C)
R470
10
(FR)
Q414 : 2SC2240(BL)
Q416 : 2SA970(BL)
POWER SUPPLY
Q9 : 2SC2603(F)or(E)
Q8
2SA1115(F)or(E)
Q6
2SC2603
(F)or(E)
Q7
2SA1115
(F)or(E)
Q10
2SA1115
(F)or(E)
Q5
2SC2240(BL)
D10
HZ6A-2L
D11
1S2473
D8
HZ11B-2L
D7
GL5HD10
POWER
IND.
D522
HZ12B-2L
D521
HZ12B-2L
D13,14 : HZ15-2L
Q15
2SA817(Y)or(O)
Q13
2SC2603
(F)or(E)
Q14
2SA1115(F)or(E)
Q16
2SC1627
(Y)or(O)
D5,6
DS135E
D1~4 : ERC102FL
TI
POWER
F1
4A
125V
S02
SWITCHED
General model
SW1
POWER
T2A
250V
C1
0.01
(AC250V)
R70
3.3M
(1/2W)
220V
240V
SW2
VOLTAGE
SELECTOR
P1
AC220/240V
50/60Hz
German model
C803
0.47/250V
D1~4 : ERC0102FL


POWER IND.
R22 1K
R43 680
C2 10/16V
D7 GL5HD10
D8 HZ11B-2L
R21 47
R20 47
C10 47/50V
R19 1.8K
Q9 : 2SC2603(F)or(E)
Q9
R32 100K
R33 100K
Q8 2SA1115(F)or(E)
R30 2.2M
R29 180K
R31 10K
Q5 2SC2240(BL)
R35 22K
R13 100K
C13 0.33/50V
R36 10K
R37 47K
R12 22K
C17 3300P /50V
R11 47K
R14 1.5K
R17 82
R16 82
R15 82 (FR)
R38 47K
R39 100K
C14 0.33/50V
D6
D5,6 DS135E
D5
T1 POWER
SW1 POWER
F1 4A 125V
C1 0.01 (AC125V)
P1 AC120V, 60Hz
S02 SWITCHED
S01 UNSWITCHED
Q15 2SA817(Y)or(O)
R47 82 (FR)
Q15
R51 560
R49 3.3K
R50 3.3K
R52 560
R48 82 (FR)
Q16 2SC1627 (Y)or(O)
D1
D2
D3
D4
C5 8000 /45V
C6 8000 /45V
C3 0.1/50V
C4 0.1/50V
D1~4 : ERC102FL
P1 AC220/240V 50/60Hz
German model
T1 POWER
SW1 POWER
F1 T2A 250V
C1 0.01 (AC250V)
R70 3.3M (1/2W)
220V
240V
SW2 VOLTAGE SELECTOR
C803 0.47/250V
C3 0.1/50V
C4 0.1/50V
D1~4 : ERC0102FL
P1 AC220/240V 50/60Hz

WIRING DIAGRAM

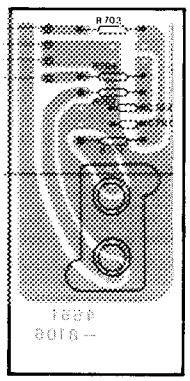
German model

PCB-4



L J601
PHONO
R J602

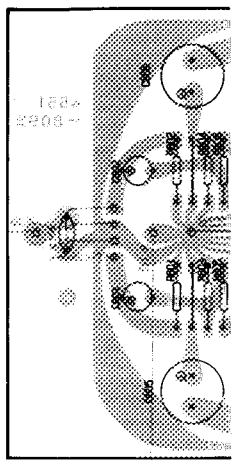
PCB-4



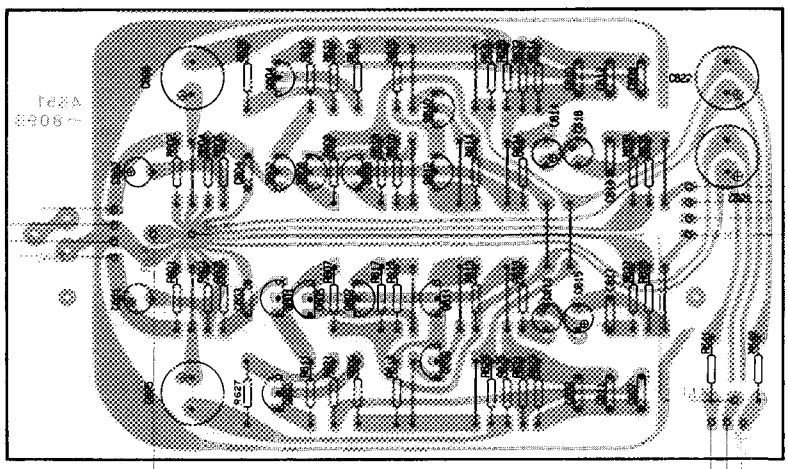
LUG2

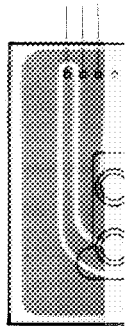
L J601
PHONO
R J602

PCB-3



PCB-3



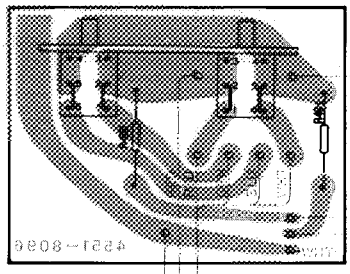


LEFT J5(
RIGHT J5(
TUN

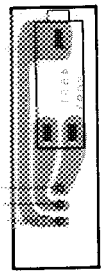
SW402
speakers 2

SW401
speakers 1

J401
HEADPHONES



PCB-10



PCB-11

TE4

German model

PCB-3

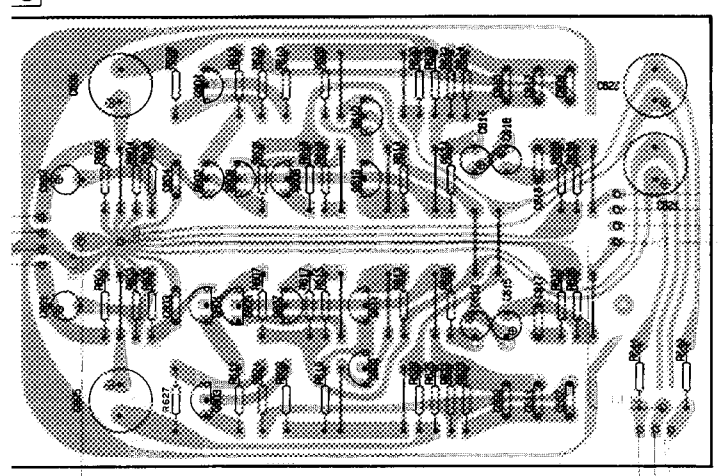
PCB-4

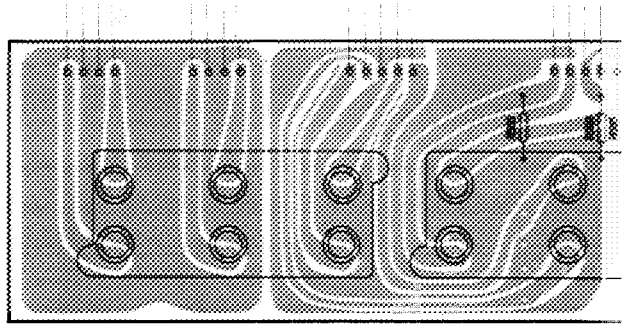
LUG2

L J601
PHONO
R J602

L J601
PHONO
R J602

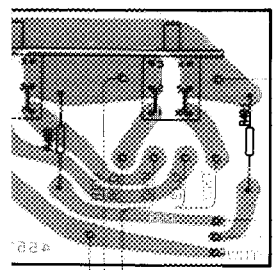
German model



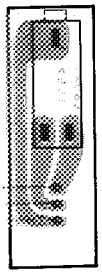


LEFT J501 J503 J505 J507 J509
RIGHT J502 J504 J506 J508 J510
TUNER VIDEO/CD IN OUT IN
INPUT TAPE I TA

J402 SW401 J401
kers 2 speakers 1 HEADPHONES



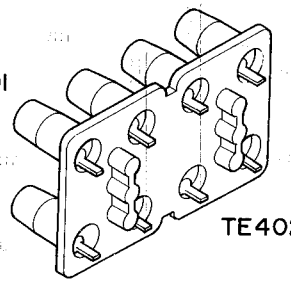
PCB-10



PCB-11

SPEAKER SYSTEM 1
LEFT GND
GND RIGHT

TE401

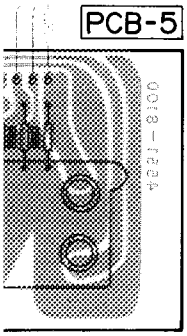


TE402

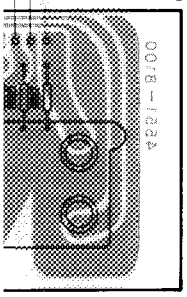
LEFT GND
GND RIGHT
SPEAKER SYSTEM 2

F	G	H	I	

PCB-5



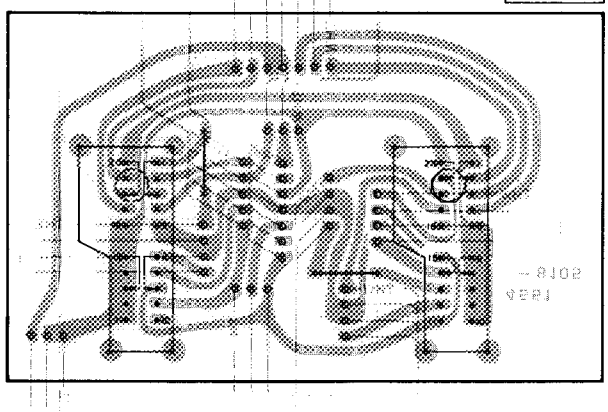
PCB-5



J511
J512
OUT

APE2

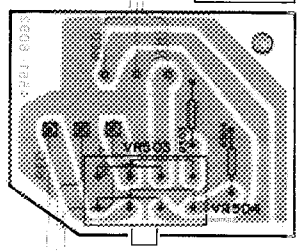
PCB-6



SW502
TAPE
MONITOR

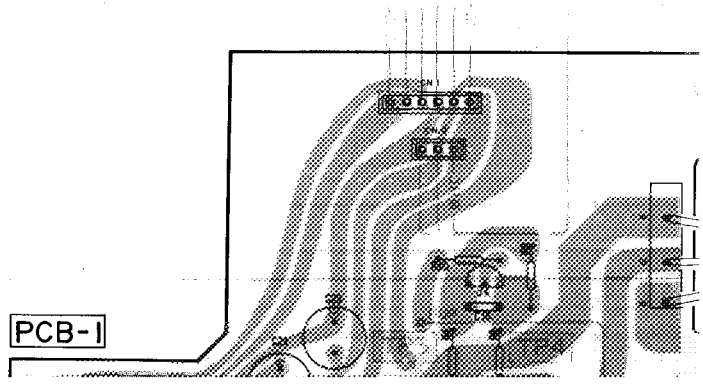
SW501
FUNCTION

PCB-9

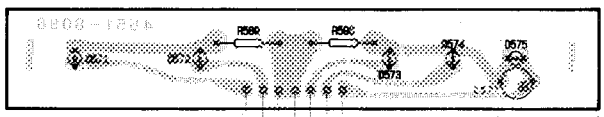


VOLUME

PCB-1

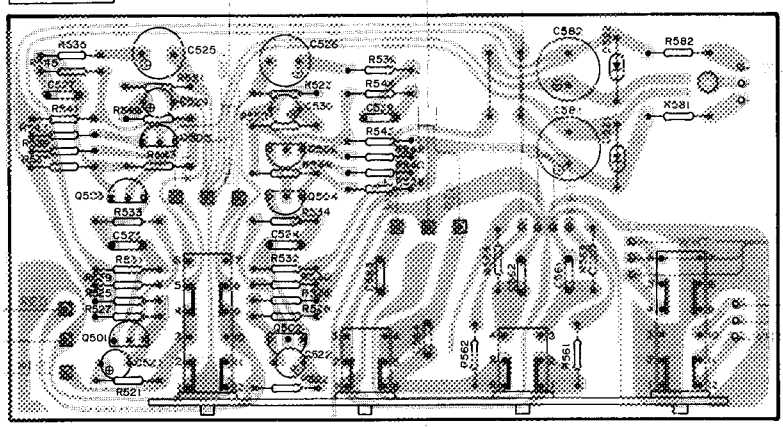


tape1 tape2 video/CD phono
tuner



PCB-7

PCB-2

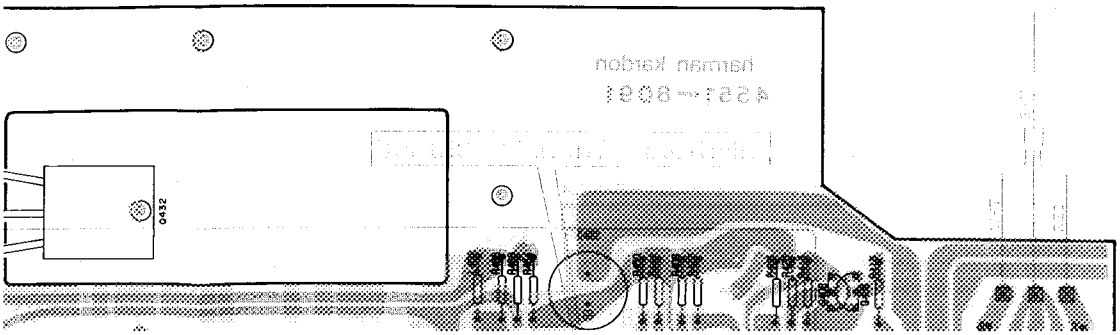


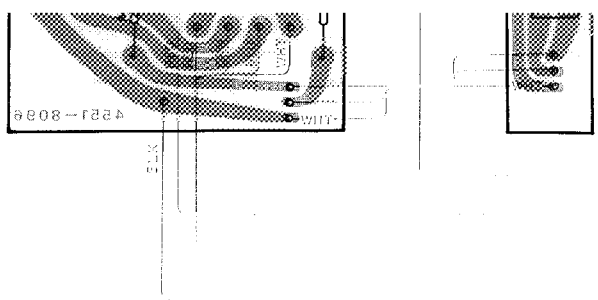
SW514 bass contour

SW513 subsonic

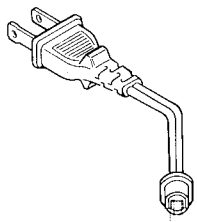
SW512 high cut

SW511 tape copy

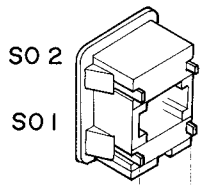




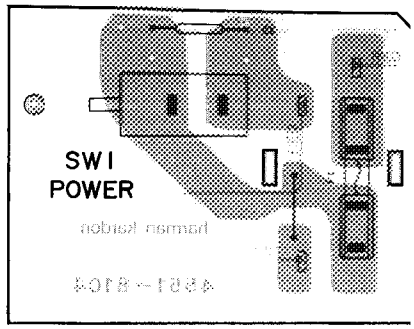
P1
AC120V,60Hz



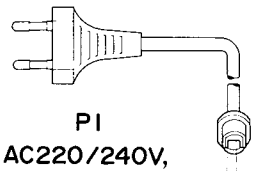
AC OUTLET



PCB-8

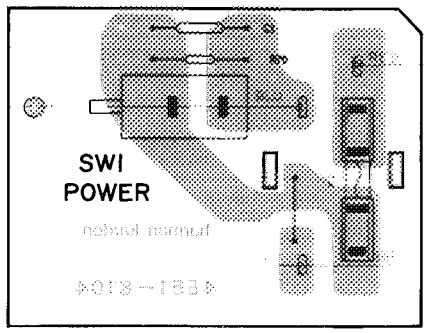


General and German models

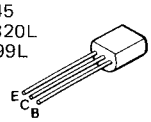
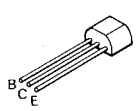
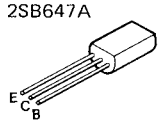
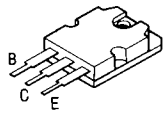
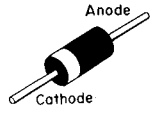
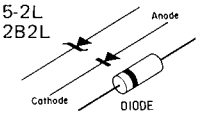


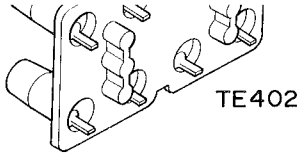
P1
AC220/240V,
50/60Hz

PCB-8



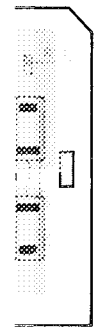
PIN CONNECTION DIAGRAM OF TRANSISTORS AND DIODES

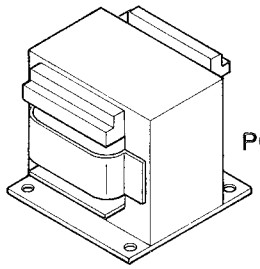
2SA970 2SC2240 2SA817 2SC945 2SC2320L 2SA999L	2SC2603 2SA1115 2SC1627	2SB646A 2SD666A 2SD667A 2SB647A	2SC3182 2SA1265	ERC102FL DS135E	HZ11B2L HZ6A-2L 1S2473 HZ15-2L HZ12B2L
					



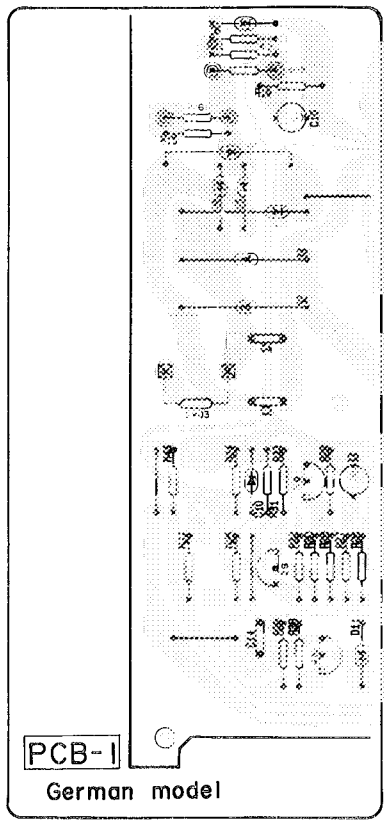
LEFT GND
GND RIGHT
SPEAKER SYSTEM 2

PCB-I

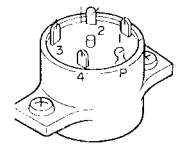




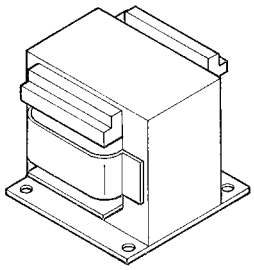
TI
POWER



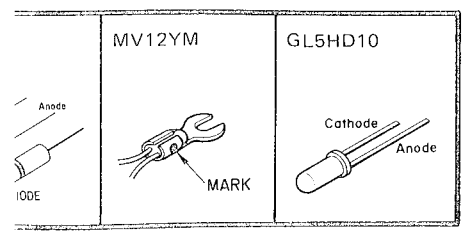
German model



SW2
VOLTAGE
SELECTOR

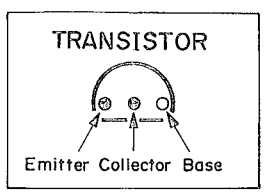


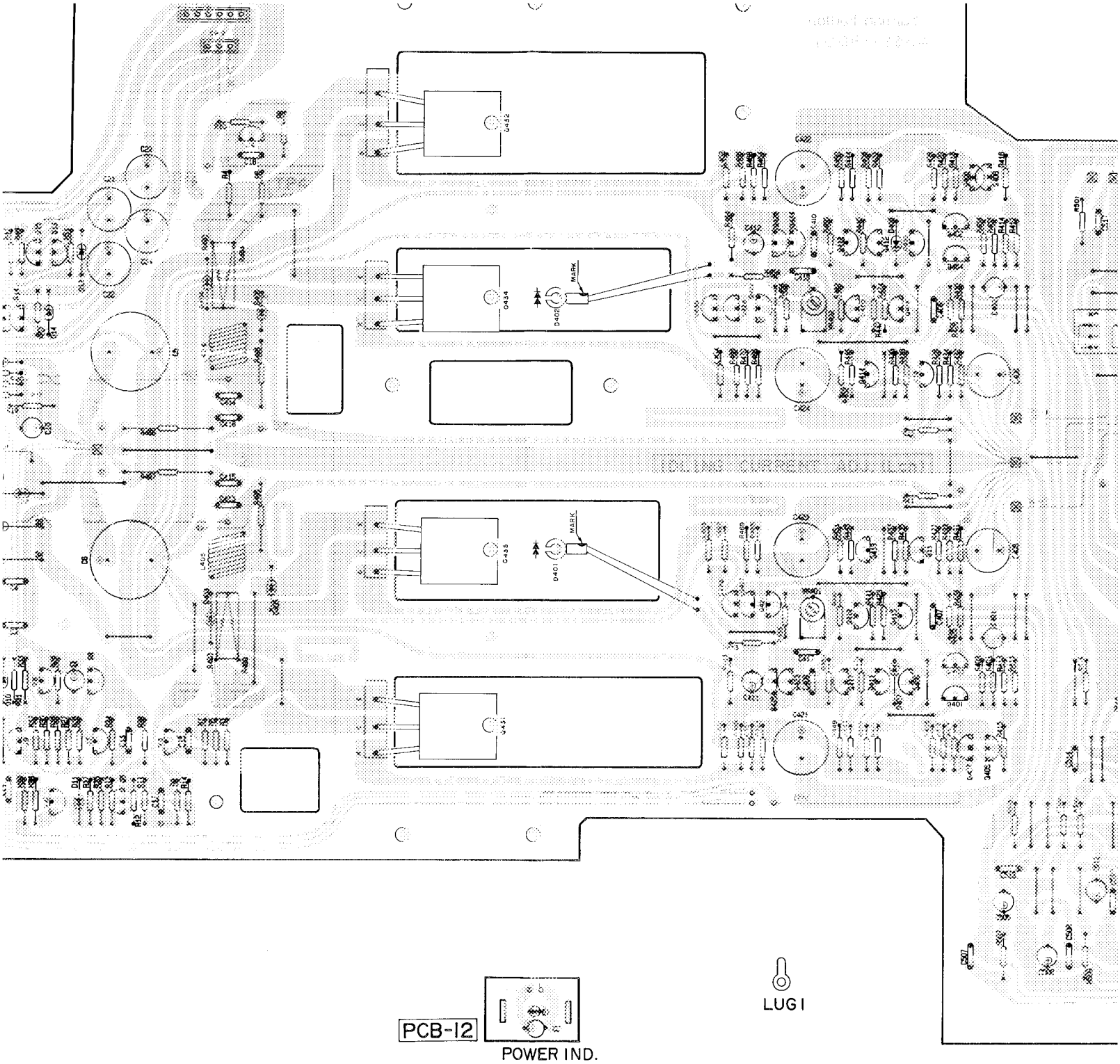
TI
POWER

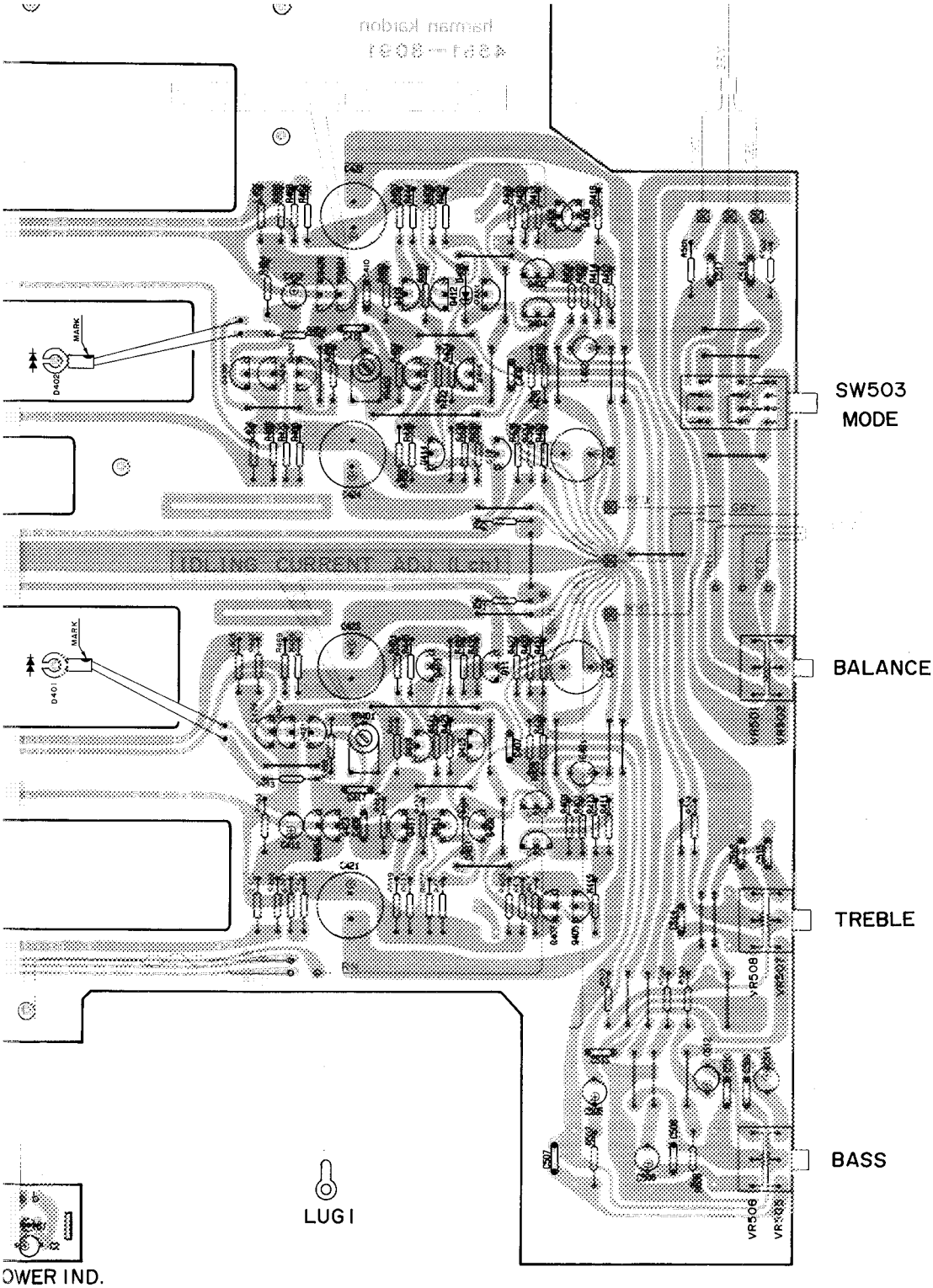


o WIRE COLOR ABBREVIATIONS

RED	: Red
ORG	: Orange
BLU	: Blue
WHT	: White
GRN	: Green
BLK	: Black
YEL	: Yellow
PUP	: Purple
PIK	: Pink




MARK
D402
MARK
D401
LUG 1
PCB-12
POWER IND.


SW503
MODE
BALANCE
TREBLE
BASS
LUG1
VR501
VR502
VR503
VR504
VR505
VR506
VR507
VR508
D401
D402
MARK
OWER IND.